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Classification of Solar Prominences for Sunspot Cycle No. 19 - 1959

BY

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Cambridge 38, Massachusetts

Contract No. AF19(604)-4962

Project No. 7649

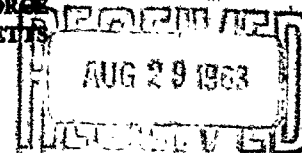
Task No. 764901

SCIENTIFIC REPORT NO. 22

August 1963

Prepared for

AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
OFFICE OF AEROSPACE RESEARCH
UNITED STATES AIR FORCE
BEDFORD, MASSACHUSETTS



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CLASSIFICATION OF SOLAR PROMINENCES FOR
SUNSPOT CYCLE NO. 19 - 1959

by Donald H. Menzel and F. Shirley Jones

ABSTRACT

This report contains a tabulation and analysis of the behavior classification of prominences observed during 1959 at the Sacramento Peak Observatory, Sunspot, New Mexico.

Similar studies for the years 1955 through 1958 have appeared under this contract as Scientific Reports No. 13, 16, 17, and 20, respectively. A summary report for the analysis of the preceding cycle was issued as Scientific Report No. 12, "Classification of Solar Prominences--XII--Summary for 1944 to 1954."

The research reported in this paper has been sponsored by the Air Force Cambridge Research Laboratories, Office of Aerospace Research, under Contract AF19(604)-4962.

INTRODUCTION

The observations used in this research consist of the complete set of prominence surveys made at the Sacramento Peak Observatory, Sunspot, New Mexico, during 1959. Because of instrumental difficulties, no observations were made after October 15 of that year. We are grateful to Dr. John W. Evans, Director of the Sacramento Peak Observatory, for permitting us to use the original survey films.

Table I contains the measures of position and area, the intensity estimates, and the classification according to the Menzel and Evans scheme (1953) with the addition of the classes ASa (coronal rain in spot areas) and ANe (suspended clouds not associated with sunspots), of all prominences in the survey.

Column 1 gives the date of the observations. Column 2 indicates the amount of spread, in terms of the position angles marked by the beginning and end of each prominence. A spread of 1° indicates the position only of each of the narrower prominences, some of which are less than 0.5° in width. Column 3 gives the latitude of the center of intensity.

Column 4 indicates the "importance" of the prominence by an assigned letter giving a rough measure of the total intensity, from D- for the most insignificant through A+ for the most impressive prominences. Column 5 records the area of the prominence, expressed in standard prominence units.

Column 6 contains the class. Doubtful classifications are followed by a question mark. Non-spot prominences so adjacent to spot prominences as to suggest association with the spot are noted by asterisks. Column 7 gives additional comments.

Table II gives the classifications for the prominences in the motion picture films. The columns show date, position angle of the center of the frame, classification, and additional comments.

TABLE I

1959 SACRAMENTO PEAK PROMINENCE SURVEYS

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comments
1959						
Jan. 8	346-358	N82	C+	400	ANd	
	20-24	N67	D-	20	BNs,s	
	25-30	N61	D	55	ANm	
	46-49	N41	D	35	BSs	
	40-70	N33	B	750	ANd*	
	78-90	N6	C	225	ANd*	
	80-86	N6	D+	125	ASf	
	101-134	S31	A	2200	ANd	Streamers
	153-155	S65	D	20	ANm	
	217-219	S51	D-	20	ANm	Poor seeing
				200	ANd	"
				25	BSs	"
	252-266	S10	C+	300	ANd	"
	277-307	N26	A	2100	ANd	" " Streamers
Jan. 9	346-353	N82	C+	315	ANd	
	356-29	N77	D-	50	BNs's	
	46-56	N38	C	275	ANd	
	68-71	N18	D	65	ANd?	
	108-131	S32	B-	550	ANd	
	215-225	S49	D-	30	BNs's	
	232-239	S31	D	100	ANd	Streamer
	249-258	S14	D	110	ANd*	Poor seeing
	256-273	S3	C	150	ASa	" "
	271-277	N6	D	100	ASf?	" "
	278-311	N27	B+	1350	ANd	" "
Jan. 19	341-344	N78	D	60	ANm	Poor seeing all day
	350-351	N86	D-	10	BNs	
	7-25	N67	B	800	ANd	
	42-44	N41	D-	25	ANm	
	47-48	N36	D-	10	ANm	
	62-88	N14	C	350	ASa	
	69-80	N12	D	90	BSs's	
	92-130	S29	A-	1700	ANd	
	136-137	S53	D-	15	ANm	
	207-210	S56	D	40	ANm	
	226-228	S37	D	35	ANm	
	242-246	S20	D-	10	BNs's	
	256-262	S5	D	95	ANd	
	261-268	N1	C+	300	ANb	
	275-287	N18	D+	115	ANd	
	293-298	N31	D	60	ANd	
	299-325	N51	B	900	ANd	Streamers
Jan. 21	332-343	N74	C	280	ANd	
	5-21	N70	D-	600	ANd	
Cont.	23-26	N59	D-	15	BNs	

Date	Spread	Year of Discovery	Depth Feet	Area in sq.	Class	Comment
1959						
Jan, 21	36-37	1917	D-	15	BNs	
Cons	40-42	1912	D-	50	BSs	
	40-45	1911	D	40	ANDs	
	51-63	1923	D	25	BSs's	
	57-67	12	D	80	ASs	
	68-80		B	110	ANDs	
	81-88		C	125	AND	
	89-91		D	50	ANs	
	92-94		D	100	ANDs	Streamer
	95-97			10	BSs	
	98-100			250	AND	
	101-103		D	20	BNs	
	104-106		D	25	BNs	
	107-109		D	20	BNs	
	110-112				AND	
	113-115				AND	
	116-118				BSs	
	119-121				AND	Stream
	122-124				ANDs	
	125-127				ASs	
	128-130				AND	
	131-133				AND	
	134-136				AND	
	137-139				AND	
	140-142				AND	
	143-145				AND	
	146-148				AND	
	149-151				AND	
	152-154				AND	
	155-157				AND	
	158-160				AND	
	161-163				AND	
	164-166				AND	
	167-169				AND	
	170-172				AND	
	173-175				AND	
	176-178				AND	
	179-181				AND	
	182-184				AND	
	185-187				AND	
	188-190				AND	
	191-193				AND	
	194-196				AND	
	197-199				AND	
	200-202				AND	
	203-205				AND	
	206-208				AND	
	209-211				AND	
	212-214				AND	
	215-217				AND	
	218-220				AND	
	221-223				AND	
	224-226				AND	
	227-229				AND	
	230-232				AND	
	233-235				AND	
	236-238				AND	
	239-241				AND	
	242-244				AND	
	245-247				AND	
	248-250				AND	
	251-253				AND	
	254-256				AND	
	257-259				AND	
	260-262				AND	
	263-265				AND	
	266-268				AND	
	269-271				AND	
	272-274				AND	
	275-277				AND	
	278-280				AND	
	281-283				AND	
	284-286				AND	
	287-289				AND	
	290-292				AND	
	293-295				AND	
	296-298				AND	
	299-301				AND	
	302-304				AND	
	305-307				AND	
	308-310				AND	
	311-313				AND	
	314-316				AND	
	317-319				AND	
	320-322				AND	
	323-325				AND	
	326-328				AND	
	329-331				AND	
	332-334				AND	
	335-337				AND	
	338-340				AND	
	341-343				AND	
	344-346				AND	
	347-349				AND	
	350-352				AND	
	353-355				AND	
	356-358				AND	
	359-361				AND	
	362-364				AND	
	365-367				AND	
	368-370				AND	
	371-373				AND	
	374-376				AND	
	377-379				AND	
	380-382				AND	
	383-385				AND	
	386-388				AND	
	389-391				AND	
	392-394				AND	
	395-397				AND	
	398-400				AND	
	401-403				AND	
	404-406				AND	
	407-409				AND	
	410-412				AND	
	413-415				AND	
	416-418				AND	
	419-421				AND	
	422-424				AND	
	425-427				AND	
	428-430				AND	
	431-433				AND	
	434-436				AND	
	437-439				AND	
	440-442				AND	
	443-445				AND	
	446-448				AND	
	449-451				AND	
	452-454				AND	
	455-457				AND	
	458-460				AND	
	461-463				AND	
	464-466				AND	
	467-469				AND	
	470-472				AND	
	473-475				AND	
	476-478				AND	
	479-481				AND	
	482-484				AND	
	485-487				AND	
	488-490				AND	
	491-493				AND	
	494-496				AND	
	497-499				AND	
	500-502				AND	
	503-505				AND	
	506-508				AND	
	509-511				AND	
	512-514				AND	
	515-517				AND	
	518-520				AND	
	521-523				AND	
	524-526				AND	
	527-529				AND	
	530-532				AND	
	533-535				AND	
	536-538				AND	
	539-541				AND	
	542-544				AND	
	545-547				AND	
	548-550				AND	
	551-553				AND	
	554-556				AND	
	557-559				AND	
	560-562				AND	
	563-565				AND	
	566-568				AND	
	569-571				AND	
	572-574				AND	
	575-577				AND	
	578-580				AND	
	581-583				AND	
	584-586				AND	
	587-589				AND	
	590-592				AND	
	593-595				AND	
	596-598				AND	
	599-601				AND	
	602-604				AND	
	605-607				AND	
	608-610				AND	
	611-613				AND	
	614-616				AND	
	617-619				AND	
	620-622				AND	
	623-625				AND	
	626-628				AND	
	629-631				AND	
	632-634				AND	
	635-637				AND	
	638-640				AND	
	641-643				AND	
	644-646				AND	
	647-649				AND	
	650-652				AND	
	653-655				AND	
	656-658				AND	
	659-661				AND	
	662-664				AND	
	665-667				AND	
	668-670				AND	
	671-673				AND	
	674-676				AND	
	677-679				AND	
	680-682				AND	
	683-685				AND	
	686-688				AND	
	689-691				AND	
	692-694				AND	
	695-697				AND	
	698-700				AND	
	701-703				AND	
	704-706				AND	
	707-709				AND	
	710-712				AND	
	713-715				AND	
	716-718				AND	
	719-721				AND	
	722-724				AND	
	725-727				AND	
	728-730				AND	
	731-733				AND	
	734-736				AND	
	737-739				AND	
	740-742				AND	
	743-745				AND	
	746-748				AND	
	749-751				AND	
	752-754				AND	
	755-757				AND	
	758-760				AND	
	761-763				AND	
	764-766				AND	
	767-769				AND	
	770-772				AND	
	773-775				AND	
	776-778				AND	
	779-781				AND	
	782-784				AND	
	785-787				AND	
	788-790				AND	
	791-793				AND	
	794-796				AND	
	797-799				AND	
	800-802				AND	
	803-805				AND	
	806-808				AND	
	809-811				AND	
	812-814				AND	
	815-817				AND	
	818-820				AND	
	821-823				AND	
	824-826				AND	
	827-829				AND	
	830-832				AND	
	833-835				AND	
	836-838				AND	
	839-841				AND	
	842-844				AND	
	845-847				AND	
	848-850				AND	
	851-853				AND	
	854-856				AND	
	857-859				AND	
	860-862				AND	
	863-865				AND	
	866-868				AND	
	869-871				AND	
	872-874				AND	
	875-877				AND	
	878-880				AND	
	881-883				AND	
	884-886				AND	
	887-889				AND	
	890-892				AND	
	893-895				AND	

Date	Spread	Lat. of Center of Intensity°	Import- tance	Area in p.u.	Class	Comment
1959						
Feb. 4	9-12	N66	D-	30	ANd	
	45-53	N29	D	60	ASa	
	46-52	N29	D	60	BSs's	
	57-66	N15	D+	130	ASa	
	65-68	N10	D-	15	BSs	
	71-78	N3	D	80	ANc	Streamer
	83-84	S7	D-	15	?	
	90-91	S13	D-	20	ANc?	
	95-129	S35	A	1350	ANd	
	135-146	S63	C	250	ANd	
	151-162	S77	D-	30	BNs's	
	211-213	S45	D-	40	ANc	
	223-236	S30	D+	160	ANd	Streamer
	240-253	S72	D	100	ANd	
	258-302	N23	A+	3700	ANd	Fine example
					BSs's	
Feb. 5	329-341	S32	D-	30	BNs's	
	342-343	S41	D-	70	ANd	
	33-44	N41	D-	25	BNs's	
	43-46	N32	D-	20	ASa	
	44-53	N29	C-	175	ANd	
	54-67	N17	D	65	BSs's	
	55-72	N11	D	110	ASa	
	68-76	N4	D+	165	ANd	
	82-126	S30	A+	2800	ANd	
	134-144	S63	C+	320	ANd	
	150-162	S78	D-	20	BNs's	
	167-168	S84	D-	20	BNs?	
	207-209	S48	D-	30	ANd	
	233-236	S41	D	65	ANm	
	241-246	S41	D-	20	BNs's	
	256-297	N20	A+	3850	ANd	Fine example
	327-335	N74	D	90	ANd	
Feb. 6	329-340	N24	C	215	ANd	
	348-352	N33	D	70	ANd	
	6-8	N86	D-	15	ANd	
	37-42	N37	D-	30	ANd	
	48-54	N18	C	200	ANd's	
	56-59	N19	D	65	ASa	
	63-64	N12	D-	20	ASa	
	77-88	S7	C+	275	ANd	
	79-94	S11	B	1000	ANa	
	92-93	S17	D-	15	BSs	
	94-127	S30	B+	1600	ANd's	
	123-124	S47	D-	15	?	
	127-129	S32	D	50	ANm	
	135-140	S41	D+	135	ANd	
	199-206	S53	C	230	ANd	
	256-263	N3	D	125	ANc?	
	271-273	N16	D	25	BSs	
	278-290	N29	C	270	ANd's	
	281-286	N26	D	50	BSs	

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comments
1959						
Feb. 10	331-334	N76	D-	55	ANm	
	338-345	N83	D+	160	ANd	
	350-1	N78	D-	15	BNs ¹ s	
	3-6	N70	D	70	ANd	
	12-21	N58	D-	35	BNs ¹ s	
	23-31	N49	D	75	ANd	
	35-49	N34	C+	285	ANd	
	53-58	N20	D+	110	ANd*	
	60-63	N14	D	40	BSs	
	64-70	N9	C	215	BSs	
	66-73	N1	C+	375	AS1	
	75-80	S3	E+	500	BSs	
	80-93	S10	C+	400	ASa	
	80-94	S10	C+	325	ANd*	
	118-126	S46	D	100	ANd	
	130-130	S50	D-	25	BNs ¹ s	
	196-202	S5	C	250	ANb	or ANb?
	231-232	S23	D+	40	ASa?	
	234-239	S20	D	80	BSs	or ANd?
	253-270	N9	B	700	ASf	
	270-280	N21	C+	450	ANd*	
	281-281	N2	D	30	BSs	
	285-288	N32	D-	30	BSs?	
	295-297	N42	D	50	ANm	
	315-316	N65	D-	25	ANc	
Feb. 22	358-5	N08	C-	165	ANd	Poor seeing all day
	35-55	N25	C	215	ANd	
	60-72	N5	C+	300	ANd	
	81-85	S12	D-	10	BNs ¹ s	
	210-211	S43	D-	75	ANd	
	221-222	S28	D-	10	?	
	228-231	S21	D	60	ANm	
	244-245	S5	D	60	ANm	
	261-263	N13	C-	150	ANb*	
	264-270	N16	D+	130	ASa?	
	292-295	N44	D	90	BSs?	
	300-301	N54	D+	140	ANd	
	325-335	N71	C-	175	ANd	
Feb. 24	353-5	N69	C-	400	ANd	
	31-33	N38	D-	60	ANm	
	45-50	N22	D-	30	BSa?	
	54-73	N6	B-	550	ANd*	
	98-101	S29	D-	165	BSs	
	129-136	S63	D	125	ANd	
	183-184	S65	D-	10	BNs	
	197-200	S50	D	70	ANd	
	207-211	S42	D	70	ANm	
	216-218	S33	D-	5	?	
	234-235	S15	D-	10	BSs	
	237-252	S3	?	200	ASf	
	242-245	S6	D-	110	BSs	
	245-249	S1	C	60	ANd*	
Cont						

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p.u.	Class	Comment
1959						
Feb. 24 Cont.	269-277	N25	D+	125	ASf	
	273-284	N29	D+	170	ASa	
	276-281	N28	D	90	ANd*	
	285-291	N39	C	165	ANm	
	291-300	N46	D+	110	ANd	
	316-320	N67	D	75	ANd	
	323-328	N73	D-	20	BNs,s	
	329-331	N80	D	90	ANb	
Mar. 2	316-349	N43	B	850	ANd	Arching streamers
	351-358	N62	C	180	ANm	
	5-26	N79	D-	20	BNs*s	
	28-40	N75	B	750	ANd	
	50-52	N61	D-	25	ASa	
	56-66	N50	D	85	BSs*s	or ANd?
	70-91	N35	B	625	ANd	
	111-118	S2	D+	120	ANd	
	123-128	S14	D	35	BSs	
	129-136	S19	D	85	ANd	
	143-160	S38	D-	35	BNs	
	180-198	S80	E-	1500	ANb	
	207-212	S83	E	90	ANm	
	223-227	S67	D	120	ASi?	
	227-235	S63	C+	235	BSs	
	256-257	S35	D-	15	BSs	
	262-274	S24	E-	425	BSs?	Flare?
	277-281	S13	D-	45	BSs	
	286-301	0	C+	325	ANd*	
	287-299	N4	D+	125	ASf	
	320-322	N29	D	65	BSs	
Mar. 14	357-359	N63	D-	45	ANc	Poor seeing all day
	32-40	N77	D	100	ANd	
	38-39	N76	D-	20	ANa?	
	51-53	N62	D-	15	ANm	
	57-65	N53	D	100	ANd	
	74-82	N37	C	250	ANa	
	80-94	N25	B+	950	ANc	Streamers
	93-100	N18	D	90	ANd	
	107-115	N2	C	260	ANd	
	189-192	S75	D	70	ANd	
	206-214	S81	C	215	ANd	
	215-223	S74	C-	175	ANd	
	224-233	S67	D+	155	ASf	
	228-240	S57	C	260	ANd*	
	289-298	S1	C+	380	ANd	
	321-335	N31	D-	600	ANd	

Date	Spread	Lat. of Center of Intensity°	Impor- tance	Area in p.u.	Class	Comment
1959						
Mar. 23	353-1	N66	D	105	ANd	Poor seeing all day
	26-54	N33	B	850	ANd	
	64-66	S1	D	20	ANm	
	76-80	S14	D	50	ANc	
	230-245	S5	B-	450	ANd*	Streamer
	243-254	N3	C+	400	AS1.1	
	252-262	N16	B	750	AS1	
	276-300	N44	B	775	ANd*	
	282-286	N39	D	65	ASa	
	322-331	N81	D-	45	BNs's	
Mar. 24	352-360	N69	C-	185	ANd	Poor seeing all day
16:55	25-34	N36	C+	320	ANd	
J.T.	39-44	N22	D	75	ANd*	
	43-50	N17	D	90	ASa	
	57-71	0	C	250	ANd	
	79-91	S22	D+	180	ANd	
	121-122	S58	D-	15	ANm?	
	191-192	S52	D-	20	?	
	208-209	S36	D-	15	ANm	Omitted
	220-241	S8	B-	625	ANd*	in the
	230-253	S1	B+	900	ASf	Analysis
	250-264	N12	C-	200	AS1	
	261-267	N20	D	85	BSs	
	268-282	N32	C+	300	BSs's	
	271-281	N35	D	90	BSs	
	277-281	N37	D-	150	ASa	
	293-294	N50	D-	20	BSs	
	297-304	N57	C	260	ANd*	
	314-316	N70	D-	10	BNs	
	322-325	N73	D-	20	BNs's	
Mar. 21	351-359	N69	C-	175	ANd	
22:40	22-35	N36	C+	380	ANd	
J.T.	39-44	N23	D	100	ANd	
	55-57	N8	D-	20	BSs	
	60-63	N3	D-	30	ASa	
	64-70	S8	D	40	ANd	
	80-85	S18	D	90	ANd	
	86-87	S22	D	20	ANa	
	89-90	S26	D	30	BSp?	
	142-149	S79	D	100	ANd	
	207-208	S37	D-	15	?	
	229-240	S10	B	500	ANd*	Arching streamer
	231-253	N3	B+	950	ASf	
	248-261	N14	C+	425	ASa	
	253-257	N11	C	200	AS1	
	258-266	N19	C	210	BSs	
	262-267	N20	D	85	ANd*	
	271-280	N32	D	90	BSs	
	276-277	N32	D	80	ASa	
	281-287	N40	C	270	AS1	
	297-308	N57	D	110	ASa	
	299-304	N50	D	75	ANd*	

Date	Spread	Dist. of Center of Intensity°	Import- ance	Area in sq	Class	Comment
1959						
Apr. 9 14:10 U.T.	338-340	N82	D	30	ANc	
	350-355	N71	C	140	ANm	
	359-13	N60	D-	15	BNs's	
	24-26	N39	D-	20	BSs	
	29-45	N29	D+	150	ASa	
	40-51	N18	C-	165	ANd	
	50-55	N11	D	120	ASa	
	59-74	S4	C	200	ANd*	Streamers
	76-80	S14	D-	30	ANd	
	81-88	S20	D+	140	AS1?	
	87-89	S24	D	25	BSs	
	91-10	S31	C	170	ANd	
	105-113	S48	D	70	ANd	
	125-127	S62	D	25	ANc	
	130-13	S7	D-	10	BNs	
	130-13	S22	D	130	ANd	
	196-217	S48	D-	25	ASa?	ANa?
	209-211	S25	C	370	ANd	
	228-229	S15	D-	5	BNs	
	248-249	N5	D-	5	BNs	
	277-287	N40	C-	190	ASa	
	280-282	N37	D	40	BSs	
	Total 3150 missing					
Apr. 15	339-344	N80	D-	15	BNs's	
	346-357	N71	C	290	ANd	
	13-14	N50	D-	5	BNs	
	19-35	N38	B-	600	ANd	
	41-44	N22	D-	20	ASa	
	52-53	N12	D-	20	BNs	
	61-63	N2	D	10	ANm	
	76-78	S13	D-	35	?	
	99-103	S37	D	65	BSs	
	121-126	S09	D	60	ANd	
	188-189	S55	D	15	BNs,s	
	219-220	S24	D-	10	BNs,s	
	226-231	S16	D-	35	ANc?	Streamer
	233-240	S8	D+	160	ANe	
	238-242	S4	D	60	ANd?	
	253-270	N17	C+	375	ANd*	Streamer
	266-273	N29	C	250	ASf	Loop-shaped streamer
	281-290	N41	D	90	ANd	Streamer
	321-333	N75	C-	160	ANd	
Apr. 20	332-356	N79	B-	550	ANd	
	13-14	N51	D-	10	BNs	
	23-24	N40	D-	15	BNs?	
	32-39	N29	D+	130	ANd	
	43-44	N21	D-	25	ASa	
	46-47	N13	D-	15	BSs?	
	52-57	N9	D-	150	ANd*	
Cont	61-67	N1	D	100	ASa	
	67-83	S12	B-	500	ANd*	

Date	Spread	Lat. of Center of Intensity°	Import- tance	Area in p.u.	Class	Comment
1959						
Apr. 20	90-95	S28	D+	120	BSs?	or ANc*?
Cont.	95-98	S32	D-	40	BSs	
	115-121	S54	D-	35	BNs's	
	189-190	S51	D-	5	BNs	
	204-206	S39	D	50	ANb	
	229-241	S12	C	250	ASa	
	239-249	N1	D	100	ANd*	Streamer
	253-256	N11	D-	25	ASa	
	255-260	N13	D	100	ANd*	
	257-264	N18	D	95	AS1	
	257-269	N24	D-	40	BSs	
	272-278	N31	D+	180	AS1	
	326-332	N82	C	225	ANc	Streamer
Apr. 21	31-37	N2	C	250	ANd	
	35-38	N63	D-	20	BNs's	
	31-34	N46	D-	35	BNs's	
	25-37	N34	C	190	ANd	
	40-42	N23	D	35	BSs	
	42-47	N19	D	40	ASa	
	49-50	N14	D	20	BSs	
	52-60	N7	C	250	AS1	
	63-85	S14	B+	850	ANd*	Streamers
	91-98	S30	D+	130	BSs	
	98-108	S39	C	300	ANd*	Streamers
	136-157	S70	D-	35	BNs's	
	164-191	S67	D-	45	BNs's	
	197-206	S43	D-	25	BNs's	
	215-224	S24	D-	30	BNs's? or ANd?	
	226-245	S11	C-	325	AS1	
	237-243	S4	D+	150	BSs	
	257-258	N14	D-	15	ASa	
	267-276	N30	D+	160	ASa	
	270-279	N29	D	110	BSs	
	273-278	N32	D	90	AS1	
	284-288	N42	D	60	ANd	
	295-296	N52	D-	10	BNs	
	299-305	N58	D	70	ANd	
May 9	334-335	N86	D-	10	BNs	
	346-0	N75	C-	190	ANd	
	9-11	N57	D-	25	ANc	
	16-27	N45	D-	20	BNs's	
	35-37	N31	D-	25	ANc	
	42-44	N24	D	70	BSs	
	42-45	N24	D-	60	ASa	
	45-51	N19	D+	125	ANd*	Streamers
	52-67	N7	C+	450	ASf	
	60-88	S6	C+	400	ANd*	
	92-110	S33	D-	35	BNs's	
Cont.	124-125	S60	C-	130	ANd	

Date	Spread	Number of stars	mag range	area in sq. arc	Class	Comment
1959						
May 9	135-147	874	D-	15	BNs ¹ s	
June	163-192	868	D-	35	BNs ¹ s	
	193-197	842	D-	60	AND	
	201-21	833	D-	130	SSs?	or ANm? Flare!
	229-240	810	D-	200	AND	
	259-244	85	D-	15	ASa	
	245-248	82	D-	15	SSs	
	246-249	82	D-	190	ANDs	
	251-254	83	D-	40	ANe	
	251-254	820	D-	80	AND	
	278-28	138	D-	100	AND	
	295-305	151	D-	100	AND	
	311-32	170	D-	55	AND	
July	33-54	176	D-	120	Alp	
	54-57	158	D-	50	AND	Grinding streamer
	51-54	121	D-	235	AND	
	53-57	112	D-	15	BNs s	
	60-70	1	D-	150	ASa	
	73-79	110	D-	100	ANDs	
	87-91	121	D-	5	BNs	
	102-11	136	D-	1-	AND	
	115-117	819	D-	1-	BNs	
	127-13	162	D-	1-	AND	
	173-17	105	D-	20	ANm	
	175-19	102	D-	10	BNs	
	212-21	131	D-	15	ANm	
	226-23	150	D-	20	ANm	
	235-23	100	D-	35	ANm	
	243-24	1	D-	60	AND	
	252-25	15	D-	50	ASa	
	257-26	116	D-	275	AND	
	274-29	137	D-	350	AND	
	296-30	152	D-	150	AND	
	315-32	170	D-	25	BNs	
	324-3	177	D-	50	ANm	
	33-35	17	D-	100	ANm	
	36-38	159	D-	10	BNs	
	36-38	150	D-	155	AND	Streamers
	45-50	122	D-	50	ASa	
	53-55	110	D-	300	ASr	
	97-107	130	D-	15	AND	
	113-12	149	D-	100	AND	
	127-13	150	D-	15	AND	
	133-15	173	D-	25	BNs ¹ s	
Aug.	164-18	171	D-	30	BNs s	

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comment
1959						
May 17	203-214	S41	C	300	ANd	
Cont.	215-220	S32	D	120	BSs?	or ANm?
	225-231	S21	C	230	ASf	
	231-237	S15	D	100	ANd*	
	233-246	S13	D	250	ASa	Very faint
	266-272	N20	D	100	ANd	
	285-289	N37	D-	50	ANc	
	294-317	N54	C	300	ANd	Streamers
	323-327	N76	D-	25	BNs	
May 21	344-351	N83	C	230	ANd	
	353-9	N66	C	240	ANd	
	45-77	N79	D-	170	ASa	
	78-87	N72	D-	110	BSs's	
	88-97	N65	D-	75	BSs	
	97-107	N40	D	100	ANd*?	
	108-111	N37	D	35	BSs	
	112-113	S42	D-	10	?	
	125-126	S56	D	50	ANm	
	130-155	S71	D-	35	BNs's	
	170-186	S72	D-	20	BNs's	
	198-200	S52	D-	15	ANm	
	219-222	S31	D-	10	BNs's	
	245-250	S4	D-	20	ANd?	
	260-272	N12	D	280	ANc	Very faint
	262-271	N16	C	250	ANd*	
	269-270	N21	D	100	ASa	
	275-281	N25	D	60	BSs	
	280-291	N34	C	215	ANd*	
	299-307	N50	C-	150	ANd	
May 22	333-7	N79	B	850	ANd	
	15-16	N55	D-	10	BNs	
	22-24	N48	D-	20	BNs	
	30-35	N39	D-	10	BNs's	
	39-56	N21	D	110	ANd*	
	53-58	N13	D-	50	ASa	
	58-66	N3	D-	25	BSs's	
	77-90	S16	C	225	ANd	
	92-104	S25	D-	15	BNs's	
	107-118	S44	D-	140	BSs's? or ANd?	
	128-132	S58	D-	60	ANc	
	137-158	S76	D-	30	BNs's	
	168-190	S74	D-	20	BNs's	
	195-200	S53	D	90	ANd	
	208-217	S39	D-	15	BNs's	
	216-225	S28	D	65	ANd	
	244-266	N4	D-	20	BNs's	
	262-279	N23	B-	600	ASa*	
	266-271	N17	C	260	ANb*	
	276-283	N25	D	75	ANd*	
	299-305	N52	D	50	BNs's?	

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comment
1959						
May 26	341-347	N88	C	180	ANd	
	355-8	N70	C	260	ANd	
	27-43	N37	B-	575	ANd	
	46-59	N18	D-	60	BNs's	
	60-65	N9	D	60	ANc	
	81-84	S10	D-	20	ANd	
	90-94	S20	D-	20	BNs,s?	
	101-102	S29	D-	5	BNs	
	116-120	S46	D	70	BS*?	
	194-198	S56	D-	35	ANc	
	211-217	S38	D-	10	BNs,s	
	233-248	S12	C+	300	ANd	
	252-254	N1	D-	20	BNs,s	
	258-273	N14	C+	475	ANd*	Streamers
	273-277	N22	D	65	ASa?	
	277-282	N30	C	190	ANd*	
May 26	335-336	N83	D-	5	BNs	
	339-346	N88	C	220	ANd	
	356-8	N68	C	250	ANd	
	27-35	N41	C-	190	ANd	
	37-59	N25	D-	25	BNs's	
	77-88	S12	C-	160	ANd	
	96-107	S30	D+	150	ANd	Streamer
	117-128	S49	D-	30	BNs's	
	143-145	S72	D-	10	BNs,s	
	155-194	S82	D-	30	BNs's	
	169-170	S83	D-	15	ANc	
	196-201	S53	D	110	ANd	
	208-211	S39	D	70	ANm	
	217-222	S23	D-	15	BNs's	
	234-247	S13	C+	275	ANd	
	251-252	0	D-	10	ANc	
	256-266	N11	D+	170	ANd*	Streaming
	258-259	N6	D-	15	ANc	
	264-272	N19	C	265	ASa	
	278-282	N28	C	160	BSa	Flare
	283-290	N34	D+	150	ASa	
	286-295	N38	D	60	ANd	
	314-323	N66	D-	10	BNs's	
May 26	334-336	N82	D-	15	BNs	
	339-346	N89	C	240	ANd	Arch
	347-351	N84	D-	45	BNs's	
	356-7	N70	C	250	ANd	Arch
	8-29	N56	D-	10	BNs's	
	27-38	N41	D-	10	BNs,s	
	57-65	N12	D	60	ANd?	
	71-73	N1	D-	25	ANd	
	84-87	S13	D	45	BSs?	or ANm?
	88-92	S17	D-	50	BSs?	
Cont.	93-94	S21	D-	10	ASa	

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comment
1959						
May 28	98-100	S26	D-	40	ANc	
Cont.	108-115	S39	D	60	ANm?	
	119-120	S46	D-	5	BNs	
	124-127	S52	D-	25	ANm	
	135-136	S63	D-	20	ANc	
	154-197	S77	D	70	BNs's	
	199-203	S52	D-	30	ANd	
	209-223	S36	C	230	ANd	
	234-243	S14	C	250	ANd	
	251-261	N3	D-	70	ASa	
	265-272	N15	D-	120	ANd*	
	269-277	N21	D	90	ASa	
	279-287	N29	D	190	ASa	
	281-283	N29	D	55	BSs	
	287-295	N38	C	175	ANd*	Streamer
	299-301	N47	D	40	ANm	
	309-327	N61	D-	20	BNs's	
May 31	352-333	N79	D-	5	BNs	
	328-349	N89	C+	300	ANd	
	0-6	N71	D	90	ANd	
	32-50	N31	B	625	ANd*	Streamer
	59-73	N8	D+	150	ANd*	
	60-61	N14	D-	20	ASa	
	70-72	N3	D	50	ASa	
	93-94	S20	D-	20	ASa?	
	116-120	S44	D	90	ANm	
	124-129	S54	C-	155	ANb	
	201-217	S44	C	250	ANd	
	232-259	S9	B	600	ANd	
	269-274	N16	D-	125	ASf	
	284-294	N33	C	220	ANe	
	288-294	N38	D	80	ANd*	
	295-297	N42	D-	30	ASa	
	315-316	N62	D-	5	BNs	
June 4	342-21	N75	D-	30	BNs's	
	26-40	N41	C	200	ANd	
	31-35	N38	D+	160	ANa	
	31-41	N38	C-	190	ANe	
	41-47	N30	D-	180	ASa	
	47-48	N27	D	30	BSs	
	50-55	N23	D-	10	BNs's	
	59-67	N12	D-	120	ASa	
	67-75	N2	D	90	ANc*	
	69-71	N5	D-	15	BSs	
	77-78	S3	D-	20	ANc	
	84-93	S14	D-	60	ANd	
	103-110	S31	D-	50	ASa	
	104-105	S30	D-	20	BSs	
	114-123	S44	C-	290	ANd	
	134-138	S61	D	60	ANd	
	170-171	S84	D-	20	ANm	
	174-192	S76	D-	30	BNs's	
Cont.	206-211	S47	D	65	ANd	

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p.u.	Class	Comment
1959						
June 4 Cont.	221-223	S33	D	75	BSs?	Arch
	223-231	S29	D-	135	ANd*	
	225-231	S27	D-	150	BSs?	
	234-245	S18	D-	20	BNs's	
	244-254	N4	D	70	ANd	
	266-267	N11	D-	5	BNs	
	271-281	N20	D	100	ASa	
	279-287	N28	D	85	ANd*	
	302-304	N48	D-	25	ANe	
	305-326	N61	D-	40	BNs's	
June 13	336-337	N78	D-	10	BNs	Omitted in the analysis Streamers
	344-350	N87	D-	40	ANd	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
	355-3	N80	D-	105	ANc	
June 15	332-334	N73	D-	25	ANm	
	339-356	N84	C	325	ANd	
	358-4	N79	D-	125	ANd	
	12-13	N67	D-	5	BNs	
	49-55	N29	D	60	ANd	
	61-73	N12	C-	250	ASa	
	65-72	N11	D-	90	ANd*	
	91-103	S20	D-	25	BNs's	
	128-133	S50	D	90	ANc	
	137-139	S58	D-	20	ANc?	
	240-251	S73	C-	180	ANd	
	275-276	N16	D-	5	BNs	
278-284	N21	D-	5	ANd		
307-310	N48	D-	15	ANd?		
P.A. 225° missing						
June 16	342-350	N76	C-	190	ANd	
	355-7	N78	C-	290	ANd	
	37-39	N42	D	85	ANc	
	48-53	N29	D	85	ANd	
	51-55	N28	D-	75	ANa	
	64-69	N13	D-	60	ANd	
	74-95	S4	D	125	ANd	
	97-104	S20	D-	60	ASa	
	111-115	S33	D-	15	ANd	
	124-136	S47	D-	30	BNs's	
	152-154	S73	D-	20	ANa	
	157-158	S77	D-	15	ANm	

Date	Spread	Lat. of Center of Intensity ^o	Importance	Area in p.u.	Class	Comment
1959						
June 16	164-208	S77	D-	30	BNs ¹ s	
Cont.	207-226	S42	C+	375	ANd	
	234-235	S26	D-	10	BNs	
	237-240	S21	D	40	BSs?	
	244-245	S16	D-	10	BNs	
	262-268	N4	D-	15	ANd	
	257-263	0	D+	115	ANe	
	269-271	N10	D-	20	ASa	
	275-292	N20	B-	650	ANc	Ascending
	292-308	N39	C	300	ANd	
	309-316	N52	D	90	ANd	
June 22	345-16	N84	B-	650	ANd	
	44-59	N27	C	180	ANd*	
	55-63	N22	C	90	ANd	
	62-92	N8	A-	1900	ANd*	Streamers
	94-112	S21	D	600	ANd	Streaming
	127-132	S47	E	120	ANd	
	158-186	S88	D-	25	BNs ¹ s	
	214-217	S48	D	70	ANd	
	244-246	S18	D-	15	BSs	
	248-251	S13	D	50	BSs	
	248-261	S9	C-	220	ANd*	
	268-299	N23	B	750	ANd	Streamer
June 23	32-64	N32	C.	300	ANd	
	60-114	S4	A	2500	ANd*	Streamers
	104-112	S24	D-	150	BSs	
	129-131	S47	D-	15	BSs?	
	137-144	S59	D	65	ANd	
	152-157	S72	D-	10	BNs ¹ s	
	163-200	S87	D-	25	BNs ¹ s	
	208-225	S48	D-	135	ANd	
	230-231	S32	D-	5	BNs	
	239-243	S22	D-	50	ANd	
	249-260	S11	C	225	ANd	
	268-272	N7	D-	40	ASa	
	274-292	N19	C	285	ASa	
	305-309	N44	D	65	BSs?	or ANm?
	330-331	N67	D-	10	BNs	
June 25	345-346	N81	D-	5	BNs	
	348-7	N88	B-	500	ANd	
	13-17	N69	D	70	ANd	
	40-43	N42	D	30	ANd	
	47-57	N32	D-	170	ASa?	or ANa?
	58-63	N22	D	60	ANa	
	82-98	S8	C	380	ANd	
	105-114	S28	B	200	ANd?	
	122-123	S42	D	10	ANd	
	141-147	S59	D	10	ANm	
	163-17	S86	D-	10	BNs	
Cont.	209-21	S52	C	10	BNs	

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p.u.	Class	Comment
1959						
June 25 Cont.	224-231	S38	D	60	ANd	or ANm?
	238-244	S24	D	80	BSs?	
	251-252	S12	D-	10	BNs	
	264-269	N2	D	120	ANd	
	281-302	N28	B-	450	ANd	
	282-291	N21	D	100	ANa	
June 28	351-18	N83	B	950	ANd	Streamer
	41-43	N44	D-	15	BNs's	
	57-59	N28	D	60	ANc?	
	70-85	N10	B-	525	ANd	
	106-122	S28	B-	500	ANd	Streamer/or ASf?
	142-143	S57	D-	15	ANc	
	205-215	S54	D-	15	BNs's	
	235-266	S13	B	650	ANd	
	274-283	N11	C-	600	ANa	
	282-290	N20	D	100	ASa	
	291-305	N34	C	300	ANc*	
	293-295	N28	D-	30	BSs	
	305-307	N40	D-	35	BSs	
July 5	339-340	N70	D-	20	ANc	Streamers
	353-358	N82	C-	150	ANd	
	6-14	N79	C+	325	ANc	
	15-26	N70	D-	10	BNs's	
	49-50	N40	D-	10	BNs	
	55-75	N27	B-	475	ANd	
	73-79	N12	D+	160	ANb	
	80-89	N3	D	60	ASa	
	80-86	N7	D	65	BSs,s	
	90-96	S4	D	110	ANd	
	104-115	S21	C+	320	ANd	
	127-128	S38	D-	10	BNs	
	135-141	S47	D	125	ANc	
	139-140	S51	D-	15	BNs	
	144-154	S60	D+	135	ANd	
	178-186	S87	D-	10	BNs's	
	213-223	S52	D	110	ANd	
	246-265	S14	B	800	ANd*	
	269-276	N3	D	105	BSs	
	278-304	N22	A-	1600	ANd*	
	309-310	N40	D-	25	ASa	
	310-316	N43	D	70	ANd*	
	332-338	N66	D-	25	BNs's	

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p.u.	Class	Comment
1959						
July 9	340-341	N70	D-	5	BNs	
	357-20	N82	C+	410	ANd	
	54-75	N26	C+	425	ANd*	
	69-72	N20	D	75	ASf	
	72-78	N16	C-	170	ASa	
	74-92	N8	B+	1200	ANd*	
	93-104	S8	C	225	ANd	
	110-120	S23	D	145	ANd	
	122-130	S34	C	265	ANd	
	136-145	S51	D	180	ANd?	
	152-161	S65	C	230	ANd	
	172-188	S86	D-	10	BNs's	
	200-201	S49	D-	10	BNs's	
	202-203	S20	C	130	ANs	Observed
	204-205	S10	C	210	BSs 1st	
Aug. 2	16-17	N82	D-	10	BNs	Poor seeing next day
	26-27	N73	D-	15	ANm	
	40-42	N60	D	30	ANm	
	71-82	N23	C+	330	ANd*	
	82-94	N15	C-	260	ASa	
	85-90	N13	C	285	AS1	
	94-100	N4	D-	70	ANd	
	115-118	S16	D-	20	BNs	
	122-127	S23	D	80	ASa	
	127-130	S27	D	50	BSs	
	138-140	S40	C	265	ANd	
	151-152	S51	D	20	BSs?	
	158-162	S58	D	85	ANd	
	172-180	S73	D-	40	BNs's	
	222-230	S54	C-	175	ANd	
Aug. 8	239-243	S41	D	80	ANm	
	260-264	S19	D-	60	ANd	
	264-266	S16	D-	25	ASa?	
	269-270	S12	D-	15	BSs	
	270-278	S5	D	90	ANd*	
	283-288	N5	C-	150	ANm	
	290-292	N10	D-	25	BSs	
	299-314	N22	B	650	ANd*	
	343-347	N71	C-	170	ANc	
	4-5	N80	D-	20	ANm	
	16-17	N83	D-	5	BNs	
	24-42	N73	D	55	BNs's	
	64-65	N38	D-	10	BNs	
	80-84	N21	D	70	ANc	
	95-102	N14	D	110	ASa	
	101-102	N2	D-	10	BSs	
Cont.	131-137	S29	C+	325	ANb	or BSs + AS1?
	134-147	S35	C-	160	ANd	

Date	Spread	Lat. of Center of Intensity	Importance	Area in p.u.	Class	Comment
1959						
Aug. 8	163-164	S60	D-	5	BNs	
Cont.	169-170	S67	D-	30	ANc?	or BSs?
	179-201	S83	D-	15	BNs's	
	224-225	S59	D-	15	ANm	
	229-235	S52	D	100	ANc	
	255-277	S21	B-	575	ANd*	
	278-284	S3	D	90	ASa	
	291-315	N19	C+	450	ANd*	
	301-305	N20	C	150	BSs	
	305-319	N26	D-	110	ASa	
	319-331	N41	C	200	ANd	
	337-338	N55	D-	10	BNs	
Aug. 9	244-12	N72	D	20	BNs's	Poor seeing all day
	301	N31	C	15	ANc	
	30-33	S71	C	60	ANd	
	38-34	S57	D	20	BNs's	
	37-31	N25	D	100	ANc	Arching streamers
	83-100	N12	D+	200	ASa	
	91-104	N7	D-	160	ANd*	
	126-146	S31	C	220	ANd	
	137-152	S43	C-	260	ANc	
	153-160	S52	D-	10	BNs's	
	165-171	S63	D+	130	ANd	
	225-229	S57	D	60	ANm	
	239-241	S44	D-	15	ANm	
	269-286	S4	C	280	ANd*	
	276-279	S6	D	75	ASa	
	286-293	N5	C-	180	AS1	
	288-290	N5	D	30	BSs	
	298-317	N20	B-	500	ANd	Arching streamers
	323-347	N45	C+	375	ANd	
Aug. 10	344-20	N71	D	65	BNs's	
	30-36	N69	D	40	ANc	
	37-31	N49	D-	20	BNs's	
	88-94	N13	D	90	ASa	
	90-100	N9	C	200	ANd*	
	98-112	S1	C+	350	ANd	
	113-126	S16	D-	20	BNs's	
	130-137	S30	D+	150	ANd	
	141-159	S44	D-	30	BNs's	
	166-172	S63	D	100	ANc	
	169-208	S76	D-	75	BNs's	
	226-232	S55	D	130	ANd	
	240-245	S40	D	115	ANd	
	258-265	S24	D-	20	BNs's	
	269-275	S13	D	80	BSs?	
	273-284	S7	C	200	ASa	
	275-279	S7	D	85	BSs	
	284-290	N2	D-	25	BSs	
	284-297	N	D	120	ASa	
Cont.	300-307	N21	C+	290	ANc*	Streamer

Date	Spread	Lat. of Center of Intensity	Importance	Area in p.u.	Class	Comment
1959						
Aug. 10	308-320	N30	D-	15	BNs's	
Cont.	327-335	N46	C	210	ANd	
Aug. 11	341-350	N62	D	75	ANd	
	13-29	N80	C	230	ANd	
	34-36	N68	D-	30	BSs?	
	37-73	N49	D	75	BNs's	
	78-81	N25	D-	40	ANa	
	83-88	N18	D	50	ANd	
	90-94	N12	D-	65	ANa	
	98-100	N5	D-	25	BSs?	
	100-109	S1	D+	130	ANd	
	135-147	S37	D	90	BSs?	or ANd?
	148-152	S46	D-	10	BNs's	
	177-178	S77	D	110	ANd	
	179-180	S78	D	110	ANd	
	181-182	S79	D	110	ANd	
	183-184	S80	D	110	ANd	
	185-186	S81	D	110	ANd	
	187-188	S82	D	110	ANd	
	189-190	S83	D	110	ANd	
	191-192	S84	D	110	ANd	
	193-194	S85	D	110	ANd	
	195-196	S86	D	110	ANd	
	197-198	S87	D	110	ANd	
	199-200	S88	D	110	ANd	
	201-207	N2	D-	50	ASf	
	291-296	N10	D-	60	ASa	
	297-304	N17	D	75	BSs	
	305-311	N25	D	125	ANd	
Aug. 12	329-345	N48	C	250	ANd	Streamers
	18-26	N81	D	120	ANd	
	28-65	N60	D-	30	BNs's	
	97-101	N6	D-	40	ANd#?	
	103-106	N1	D-	20	ASa	
	104-112	S2	D-	100	ANd#	
	128-132	S25	D	45	ANd	
	142-158	S43	D-	15	BNs's	
	150-151	S46	D-	15	ANc?	
	165-171	S63	C-	135	ANd	
	229-233	S54	D-	50	ANc	
	236-243	S47	D	110	ANc	Streamer
	245-261	S30	C	250	ANd	"
	269-278	S14	D-	50	ASa	
	284-295	N5	D	120	ASa	
	289-294	N6	D-	45	ANd	
	300-309	N18	D-	45	ASa	
	309-317	N29	C	230	BSs?	
	318-328	N35	D	70	ANa	

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p u.	Class	Comment
1959						
Aug. 17	352-16	N81	D	55	BNs's	
	15-24	N83	C	210	ANc	
	31-35	N73	D-	45	ANd	
	38-59	N57	D-	25	BNs's	
	71-87	N27	B-	500	ANd*	
	80-103	N13	C	225	ASa	
	87-101	N12	D	120	BSs	
	104-107	S1	D	60	ANc?	
	109-118	S6	D-	20	BNs's	
	126-127	S21	D-	15	ANm	
	130-138	S28	D-	25	BNs's	
	134-140	S31	D	85	ANd?	
	153-157	S48	D-	45	?	
	163-170	S61	D	90	ANd	
	183-204	S83	D-	25	BNs's	
	205-232	S70	D	55	BNs's	
	246-248	S30	D-	20	ANm?	
					ANc	
					BNs's	
					ANd*	
					BSs	
					ANd*	
					BNs's	
Sept. 1	349-8	N74	D-	25	BNs's	Poor seeing all day
	14-19	N85	D-	100	ANm	
	19-32	N82	C+	350	ANd	
	80-83	N30	D-	25	BNs's	
	87-92	N21	D-	130	ANd	
	98-104	N10	D-	60	ASa	
	99-102	N10	D	40	BSs	
	127-146	S25	E	600	ANd	Streamers
	158-166	S51	D	100	ANd	
	183-188	S73	D-	20	BNs's	
	197-198	S82	D-	20	ANb	
	222-238	S61	D	110	ANd	
	256-260	S33	D	85	ANd	
	268-270	S22	D-	35	BSs	
	270-292	S11	B	900	ANd*	Ascending?
	304-313	N18	C	175	ANd*	
	306-313	N18	D	55	BSs	
	306-328	N25	B-	1550	AS1	
Sept. 6	354-355	N62	D-	5	BNs	
	18-25	N83	C	185	ANd	
	29-37	N76	C	175	ANd	
	46-57	N61	D-	15	BNs's	
	86-119	N12	C-	525	ANa	
	87-91	N23	D	50	ANd	
	115-118	S5	D	60	ANm	
	135-144	S27	C	200	ANd	
	153-159	S43	D	60	ANd	
Cent.	174-176	S72	D-	50	ANd	

Date	Spread	Lat. of Center of Intensity°	Importance	Area in p.u.	Class	Comment
1959						
Sept. 6	183-192	S74	D-	20	BNs's	
Cont.	219-225	S69	D-	15	BNs's	
	235-240	S54	D	75	ANd	
	253-257	S37	D	40	ANd	
	258-282	S21	B-	500	ANd	
	282-292	S5	C	235	ANd	
	296-302	N7	D	80	ANd	
	305-307	N14	C	50	BSs	
	310-319	N23	C-	235	AS1	
Sept. 8	337-20	N66	D	55	BNs's	Poor seeing all day
	343-345	N52	D-	20	ANm	
	21-39	N82	C-	375	ANd	
	91-99	N19	D	100	ANd*	
	94-103	N15	D	120	ASa	
	103-108	N8	D	100	ANd*	
	110-111	N2	D-	15	BSs	
	110-117	0	D-	100	ASa	Faint
	117-123	S7	D-	25	ANc,c	
	127-137	S18	C	280	ANd*	
	137-142	S25	D-	55	ASa	
	143-147	S32	D-	20	BSs	
	147-156	S38	D	120	ANd	
	167-191	S66	D-	60	BNs's	
	206-207	S82	D-	10	BNs	
	234-240	S56	D	65	ANd	
	260-273	S24	D	240	ANd	
	279-283	S12	D	90	ANd	
	288-290	S7	D	40	ANd	
	295-300	N4	D	80	ANc*	
	300-321	N18	D	125	BSs	
	301-324	N19	B-	650	AS1	
Sept. 9	348-349	N56	C-	15	BNs	
	3-25	N79	C	10	BNs's	
	42-47	N69	D-	40	BNs's	
	58-59	N54	D-	10	BNs	
	80-81	N33	D-	15	ANa	
	87-97	N20	D	70	ANd	
	109-120	0	D	85	ANa	
	112-120	S2	D-	40	ANd	
	134-162	S34	B	850	ANd	Arching streamers
	177-180	S74	D	65	ANc	
	201-202	S83	D-	20	BNs	
	206-240	S67	D-	40	BNs's	
	243-245	S49	D-	40	?	
	250-259	S38	D-	130	ANc*	
	260-266	S31	D	60	BSs's	
	265-272	S24	D	130	ANc*?	
	280-281	S12	D-	10	BNs	
	289-291	S3	D-	20	BNs?	
	305-310	N15	D-	150	ASf	
	311-318	N21	C	265	AS1	

Date	Spread	Lat. of Center of Intensity°	Import- tance	Area in p.u.	Class	Comment
1959						
Sept 11	334-344	N47	D	85	ANd	Poor seeing
	32-40	N76	B	90	ANd	" "
	43-44	N69	C	5	BNs	" "
	P.A. 90° to 315° missing: omitted in the analysis					
Sept 13	336-337	N42	D	15	ANm	Poor seeing all day
	347-351	N55	D	50	ANc	
	356-359	N63	D	20	ANd	Streamers
	23-24	N83	D	10	ANm	
	35-44	N74	B	115	ANd	
	54-55	N59	D	15	ANm?	
	80-104	N16		550	ASa	
	90-98	N10		90	BSa	
	123-129	S12		300	ANb	
	134-138	S22	D	75	ANm	
	140-141	S27	D	25	ANb	
	148-149	S35	D	20	?	
	162-165	S50	D	35	ANd?	
	174-176	S61	D	40	ANc	
	179-183	S64	D	45	ANm	
	235-238	S58	D	45	ANd	
	247-251	S41	C	250	ANd	
	271-281	S8	C	190	ANd	
	302-307	N11	D	75	ANd	
	308-325	N20	C	225	AS1	
	311-326	N23	D	130	BSa's	
	313-324	N26	D	90	ASa	
Sept 21	34-36	N28	D	15	ANm	Flare?
	52-58	N57	D	10	BNs	
	79-85	N15	C	135	ANd	Streamers
	96-102	N18	D	60	BSa	
	101-109	S11	D	90	ANd	
	109-119	N2	C	280	ASr	
	110-117	N2	C	190	ANd	
	119-122	S5	D	70	ASa	
	140-148	S20	D	155	ANd	
	148-161	S41	B	650	ANd	
	172-173	S58	D	10	RNc	
	176-179	S62	D	25	ANm	
	233-246	S55	D	10	BNs's	
	240-246	S52	D	35	ANc	
	256-260	S35	D	15	BNs's	
	266-278	S23	B	500	ANd	
	297-299	N3	C	25	ANc	
	299-306	N6	D	120	BSa?	
	310-317	N19	D	15	BNs's	
	324-339	N3	B	400	ANd	

Date	Spread	Lat. of Center of Intensity°	Impor- tance	Area in p.u.	Class	Comment
1959						
Sept. 28	338-339	N42	D-	15	ANm	Poor seeing all day
	61-66	N53	D	75	ANd	
	90-95	N23	D	60	ASa	
	94-96	N21	D	50	BSs	
	102-112	N10	C-	170	AS1	
	103-112	N4	D	70	ANd*	
	118-132	S6	C+	300	ANd	
	132-163	S34	A-	1450	ANd	
	199-201	S81	D-	40	ANc	
	230-235	S64	C	180	ANd	
	246-247	S50	D-	20	?	
	315-319	N20	D	85	ASa	
	325-332	N32	D-	65	ASa	
	331-333	N34	D-	35	ANd	
Oct. 15	68-76	N45	D	150	ANd	Poor seeing all day
	91-109	N16	B-	550	ANd	
	116-119	S1	D	90	ASa	
	124-137	S15	C	200	ANd	
	155-166	S45	D*	150	ANd	
	173-178	S60	D	80	ANd	
	240-252	S51	D-	40	ANd?	
	278-280	S17	D-	15	BNs	
	290-311	N4	B	650	ANd	
	315-317	N20	D	65	ASf?	
						Ascending?

TABLE II
SACRAMENTO PEAK PROMINENCE FILMS

DATE	P.A.	CLASS	COMMENTS
1959			
Jan. 8	113°	BSs, ANd*, ANe	Arching streamers; bright horizontal surge flare
23	316	ANd, ANd	Arch
Feb. 2	255	ANd*, ANb*, BSs, BSs, ASa	Loop-shaped surge
4	279	ANd	Very stable
5	276	ANd	Ascends in fine arch
10	75	ANd*, BSs,s, ASl,a, BSs	
Mar. 1	105	BSs, ANd*	Surge flare evolves into loops
24	267	ASl,a, BSs's, ANd*	Surges flare along loops
25	255	ANm*, BSs, ASa, ANd*, ASl	
Apr. 5	270	ANd*, BSs	
8	31	ASl,a	
19	239	ANc*, BSs, ANd*, ESs, ASl	
21	70	BSs, ASl, ANd*, BSs, ANd	
23	270	BSs?, ASl	
May 8	50	BSs,p, ASa,l	Dome-shaped surges flare along loops
9	45	BSs, ANd*, ASa	Complex
13	77.5	ANd*, ASa, BSs, ANd*, BSs	Arching streamers; flare in surge by ANd*
15	60	ASl, ASa, BSs, ANd*	
16	55	ASl,a, BSs, ANd*, ANd*	
19	75	ASl,a, BSs	
22	270	BSs, p, ANb*, ASl, a	
26	264	ANd*, BSs, ANd*, ASl	
27	275	BSs, ASa,l, BSs, ANd	Dome-shaped flare at base of loops
29	95	ASl, ANd*, ANd	
June 4	51	ASl,a,l	
5	225	BSs? or ASm?	
6	270	ANd*, BSs	Looping streamers
9	60	ASa, ASl,a, ESa, ANd*	Flare; slow surge brightens and turns into loops
10	60	ASl,a, BSs,p, ASl	
11	65	ASa,l, BSs, ANd*, ASl	
	250	ANd*, BSs's, ASl, BSs	Surges at base of loops flare
12	250	ANc*, BSs, ANc*	Arching streamers
15	67	ANd, BSs,p, ASa, ANc*	
Cont.			

COMPARISON OF CLASSES FROM SURVEYS AND FILMS

In 1959 motion pictures were made of the more interesting prominences on 59 days at the Sacramento Peak Observatory, Sunspot, New Mexico. A comparison of Tables I and II reveals that on 37 of these days no single-frame surveys were made. Hence, we have the observations on only 22 days available for a comparison of the classifications made in the two media.

Table III shows the classifications given to 81

prominences. Of these, 57 were observed in both media, 17 were observed in surveys only, and 7 were observed in films only. Of the 57 prominences observed in both media, 33 were classified as A, 12 as B, 10 as C, 1 as D, and 1 as E. Of the 17 prominences observed in surveys only, 10 were classified as A, 4 as B, 2 as C, and 1 as D. Of the 7 prominences observed in films only, 4 were classified as A, 2 as B, and 1 as C. The percentage of prominences classified as A is 55 per cent, as B is 22 per cent, as C is 17 per cent, as D is 3 per cent, and as E is 1 per cent. The percentage of prominences classified as A is 55 per cent, as B is 22 per cent, as C is 17 per cent, as D is 3 per cent, and as E is 1 per cent.

TABLE III
COMPARISON OF CLASSIFICATIONS FROM FILMS AND SURVEYS

PROMINENCE TYPES SEEN IN SACRAMENTO PEAK FILMS - 1959

PROMINENCE TYPES SEEN IN SACRAMENTO PEAK SURVEYS - 1959														Missing
	ASa	ASl	ASf	BSs	BSp	ANa	ANb	ANc	AND	ANe	ANm	BNs		
ASa	11	2												
ASl	1													
ASf														
BSs				12									2	
BSp														
ANa		1												
ANb							1							
ANc								1						
AND								1	1		2			
ANe														
ANm											1			
BNs				1										
Missing	1			7	3									

ANALYSIS

In Table IV are tabulated the average number of prominence units per day for the various prominence classes and for each 10° of solar latitude.

Table V lists the average number of prominence units at all latitudes for types A and E, S and N, those unclassified, and for all together, for each third of the year. The period of January to April exhibits an extraordinary peak in solar prominence activity.

The material in the S-type class, in which the prominence material moves downward toward the chromosphere, accounted for 93 per cent of the classified prominences; S-types, or sunspot classes, made up 20 per cent of the total.

From January to April there were an unusual number of large hedgerows, especially in the northern hemisphere. These resulted in the highest average number of prominence units per day for any one-third year so far studied (1944 to 1959). From May on the northern hemisphere continued to account for more than 50 per cent of the prominence areas.

Prominences denoted with an asterisk are those which show interaction with the prominences surrounding the sunspot areas. Such activity was exhibited by 12 per cent of the tree trunks (ANb), 27 per cent of the trees (ANc), and 26 per cent of the hedgerows (ANd).

TABLE IVa

AVERAGE NUMBER OF PROMINENCE UNITS PER DAY

AVERAGE NUMBER OF PROMINENCE UNITS PER DAY

Northern latitudes

[illegible]

TABLE IVb

AVERAGE NUMBER OF PROMINENCE UNITS PER DAY

Southern Latitudes										All S
Class	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Latitude
January - April 19 days' observations										
ASa	28.9	13.2	2.1		1.3					45.5
ASl		24.5					6.3			30.8
ASf	10.5						8.2			18.7
BSs	42.1	11.1	36.8	6.3	0.5	5.3	12.4			114.5
BSp			1.6							1.6
ANa	52.7	2.1	1.1		2.1					58.0
ANb				2.6				78.9		81.5
ANc		1.8		5.3		13.2	1.3			21.6
ANd	152.9	124.5	377.9	314.2	24.2	52.4	66.8	25.3	11.3	1149.5
ANe	8.4	1.1								9.5
ANm	1.2			1.7	3.7	6.6	1.1			24.0
BNs	0.5	2.1	2.1	1.9	3.1	5.3	6.6	2.6	2.6	27.1
Unclassed	0.8	1.3	0.5	1.6	0.8					5.5
All	300.8	182.6	428.7	343.5	36.0	82.8	102.7	106.8	13.9	1587.8
May - August 27 days' observations										
ASa	21.7	15.0	3.3	1.9						41.9
ASl										-
ASf			8.5							8.5
BSs	3.7	14.5	18.5	18.5	8.3	0.7				64.2
BSp										-
ANa								0.7	0.6	1.3
ANb			12.0			5.7				17.7
ANc	3.0		1.5	4.8	21.7	9.1	5.6			45.7
ANd	216.5	132.7	155.0	53.7	69.5	61.5	27.6	6.7		723.2
ANe	0.4					1.3				1.7
ANm	3.1	3.0	0.6	11.1	8.5	9.3		1.3	0.7	37.4
BNs	1.3	3.1	3.0	3.7	4.8	1.7	4.6	18.3	6.3	47.0
Unclassed					2.0	4.1				6.1
All	249.7	168.5	202.4	93.7	144.6	93.4	27.6	27.0	7.6	994.7
September - December 6 days' observations										
ASa	20.0		6.9							26.9
ASl										-
ASf										-
BSs			4.4	10.0						14.4
BSp										-
ANa										-
ANb		37.5	3.1						2.5	43.1
ANc	3.1		16.2	16.2			5.0	8.1	5.0	53.6
ANd	113.1	183.8	275.6	318.1	146.9	50.6	36.2	6.2	-	1130.5
ANe						4.4				4.4
ANm	7.5		9.4				11.2			28.1
BNs	2.5	3.1		1.9		2.5	14.4	5.0	3.8	33.2
Unclassed				2.5	7.5					10.0
All	146.2	224.4	315.6	348.7	154.4	57.5	66.8	19.3	11.3	1344.2

TABLE V
SUMMARY FOR 1959

<u>AVERAGE NUMBER OF PROMINENCE UNITS PER DAY AT ALL LATITUDES</u>			
Type	Jan. - Apr.	May - Aug.	Sept. - Dec.
A	3958.2	2434.7	2523.0:*
B	280.1	215.4	167.7:
S	757.5	423.5	725.0:
N	3480.8	2226.6	1965.7:
Unclassed	5.5	6.1	10.0:
All	4243.2	2656.2	2700.7:

* :Only 8 days' observations, hence low in weight.

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